Information Science and Technology Center Seminar Series

Vince Clark
UNM and Mind Research Network

"Acceleration of Learning to Identify Concealed Threats using Brain Stimulation Targeted with Neuroimaging"

Wednesday, February 9, 2011
3:00 - 4:00 PM
TA-3, Bldg. 1690, Room 102 (CNLS Conference Room)

Abstract: Learning to accurately perceive and categorize objects in a complex environment is essential for acquiring many forms of expertise. This ability was likely influenced by the need to detect hidden predators and prey through evolution. In modern times, warfighters must use these same perceptual capabilities to identify concealed threats, such as IEDs. However, there has been little research on the brain basis of this capability, nor on the development of neuroscience-based methods to enhance learning and performance of this task. In this study, transcranial direct current stimulation (TDCS) was used to accelerate learning to identify concealed threats hidden in a naturalistic virtual Middle-Eastern environment. Multimodal neuroimaging studies using fMRI and MEG identified specific brain regions that were involved in learning and performance of this task. TDCS performed over these areas during training in a series of single blind, randomized studies resulted in up to two times greater increase in learning and performance relative to a sham control condition. This difference lasted for over an hour after training was completed. The amount of learning was sensitive to electrode location and to current strength in a dose-dependent fashion. These results suggest that the brain imaging and stimulation methods developed here may be useful to increase performance for a variety of difficult real-world visual-perceptual tasks, such as the identification of IEDs and other threats, and monitoring remote surveillance images. With further development, these methods show great promise for accelerating a variety of other forms of learning, and may one day lead to a significant transformation in training methods. Ongoing studies in our laboratory of the neurochemical and cognitive effects of TDCS will also be discussed.

Biography: Vince Clark is an Associate Professor of Psychology and Neuroscience at the University of New Mexico. He received his Ph.D. in Neuroscience from U.C. San Diego and trained in functional neuroimaging at the National Institutes of Health. He is a past Scientific Director of the Mind Research Network and is currently Director of the Clinical Neuroscience Center, a new brain stimulation and imaging facility being built at UNM, and also serves as an editor of the journal *NeuroImage*. His research uses structural and functional brain imaging to investigate cognitive processes in healthy people, and to examine how these systems are disrupted in patients with brain and mental illness, including addiction and schizophrenia. He is using brain stimulation techniques to confirm the results of brain imaging studies, and to develop new methods to enhance memory and cognition.

UNCLASSIFIED
Contact the technical host Garrett Kenyon, garkenyon@gmail.com, 667-1900 or Frank Alexander, fja@lanl.gov, 665-4518 for further information.
Hosted by the Information Science and Technology Center (ISTC)